

Title: Defining Resistor Color Codes and Values for Electronic Application

Link to Outcomes:

- **Communication** Students will demonstrate their ability to communicate mathematics with language and the symbolism of mathematics.
- **Reasoning** Students will demonstrate their ability to reason mathematically. They will make conjectures, gather evidence, and build arguments.
- **Connections** Students will demonstrate their ability to make connections among various mathematical topics and their applications to other disciplines.
- **Technology** Students will demonstrate their ability to use technology where appropriate as they solve real-world problems.
- **Estimation** Students will demonstrate their ability to apply estimation strategies in computation with the use of technology, in measurement, and in problem solving. They will determine reasonableness of solution.
- **Patterns/
Relationships** Students will demonstrate a positive attitude toward mathematics and will value and appreciate the role of mathematics in school, the culture, and society.

Brief Overview:

This lesson deals with application of color codes to solve mathematical valuation of electrical components.

Grade/Level:

8 - 10

Duration/Length:

Actual time is 2 - 3 days. Students will be introduced to resistor codes table and its application. They will use technical equipment to verify findings.

Prerequisite Knowledge:

Students need:

- ☐ an understanding of place value and multipliers.
- ☐ an introduction to basic electronics theory.
- ☐ basic knowledge of the use of a volt meter.

Objectives:

Students will:

- extend their knowledge of codes and equations to the real-world and be able to apply this information.
- brainstorm possible solutions to problem.
- understand color coding system for resistor.
- read and value code systems and multipliers.
- utilize voltmeter for measuring and verifying estimates.
- demonstrate real world solution to individual needs.
- connect academic knowledge to real world experience for students.

Materials/Resources/Printed Materials:

- ☐ Assorted resistors
- ☐ Resistor color code chart
- ☐ Resistor circuits
- ☐ Voltmeter
- ☐ Worksheets

Development/Procedures:

- Begin class by introducing resistor and its function. Explain size constraints of resistors and the need to value each. Assign students to teams to brainstorm possible methods of recording resistor values directly on the resistor. Emphasize that they are too small to write on. Suggest that students consider alternate methods such as symbols, colors, lines, etc. Challenge students to solve problem in a logical and functional manner.
- Introduce resistor color code chart and explain its usage. Demonstrate several examples of solving values using the color chart. Require students to complete practice sheet of resistor codes (WORKSHEET #1) . Emphasize that resistor color codes are a universal language and can be used by people in any country.
- Require students to solve resistor values from actual resistors given to them. When students have solved color codes of resistors, they must then measure actual value by use of a resistor (WORKSHEET #2).

Demonstrate proper use of voltmeter and how it is used to measure resistors.
Have each student complete chart listing estimated values and measured values.
Compare differences.

Evaluation:

Teacher will move to each group and evaluate individual performance and group dynamics.
Successful measurement of resistors and use of meter will also be included in the evaluation.
A final test of resistor values and measurement will be used.

Extension/Follow Up:

The students could begin to assess and measure resistive circuits, both series and parallel,
as a continuation of complex circuits.

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RESISTOR COLOR CODE

COLOR	FIRST BAND	SECOND BAND	THIRD BAND
BLACK	0	0	x 1
BROWN	1	1	x 10
RED	2	2	x 100
ORANGE	3	3	x 1000
YELLOW	4	4	x 10000
GREEN	5	5	x 100000
BLUE	6	6	x 1000000
VIOLET	7	7	x 10000000
GRAY	8	8	x 100000000
WHITE	9	9	-----

FOURTH BAND INDICATES ACCURACY:

GOLD = -5% TO + 5%

SILVER = -10% TO +10%

NO FOURTH BAND = -20% TO +20%

RESISTOR WORKSHEET #1

Solve for each set of resistor colors

1. Red, blue, green _____
2. Red, red, black _____
3. Green, red, brown _____
4. Violet, orange, orange _____
5. Blue, black, black _____
6. Red, green, green _____
7. Gray, violet, red _____
8. Yellow, brown, yellow _____
9. Orange, red, red _____
10. Orange, orange, orange _____
11. Brown, white, black _____
12. Green, white, red _____
13. Orange, red, brown _____
14. Violet, violet, red _____
15. Red, white, blue _____
16. Yellow, orange, red _____
17. Yellow, yellow, green _____
18. Red, brown, black _____
19. Brown, red, brown _____
20. Violet, yellow, orange _____

ANSWER KEY:

WORKSHEET #1

Solve for each set of resistor colors

1. Red, blue, green ____2600000____
2. Red, red, black ____22____
3. Green, red, brown ____520____
4. Violet, orange, orange ____73000____
5. Blue, black, black ____60____
6. Red, green, green ____2500000____
7. Gray, violet, red ____8700____
8. Yellow, brown, yellow ____410000____
9. Orange, red, red ____3200____
10. Orange, orange, orange ____33000____
11. Brown, white, black ____19____
12. Green, white, red ____5900____
13. Orange, red, brown ____320____
14. Violet, violet, red ____7700____
15. Red, white, blue ____29000000____
16. Yellow, orange, red ____4300____
17. Yellow, yellow, green ____440000____
18. Red, brown, black ____21____
19. Brown, red, brown ____120____
20. Violet, yellow, orange ____74000____

RESISTOR VALUE WORK SHEET #2

[illegible]